PHASE DIFFERENCE PLATE, LAMINATED POLARIZING PLATE AND LIQUID CRYSTAL DISPLAY DEVICE

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Abstract of **JP2000056132**

PROBLEM TO BE SOLVED: To provide a liq. crystal display device with excellent visibility as for contrast, monochromatic display or the like in a broad visual angle by providing a thinner phase difference plate which effectively compensates for a double refractivity by a liq. crystal cell. SOLUTION: A liq. crystal display device is constituted by a phase difference plate, a laminated polarizing plate, and the phase difference plate and/or the polarizing plate at least on one side of a liq. crystal cell. The phase difference plate satisfies 200 nm<Re<500 nm and Re<Rz, when nx and ny are main refractive indexes in an intra-plane and nz is a main refractive index in a direction of the thickness, and further there are relations of nx>ny, (nx-ny)d=Re and (nz-nx)d=Rz. The laminated polarizing plate consists of a laminated body of the phase difference plate and a polarizing plate.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the suitable phase contrast plate for an improvement of the viewing-angle property by optical compensation of a liquid crystal cell, the laminating polarizing plate which used it for the list, and a liquid crystal display.

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PRIOR ART

[Description of the Prior Art] The technique of arranging a phase contrast plate to a liquid crystal cell, compensating the optical property based on a birefringence for the purpose of prevention of a foreground color, contrast, etc. changing with the viewing angles which look at a display by the birefringence by liquid crystal, and improving a viewing-angle property is proposed.
[0003] Conventionally, as a phase contrast plate for this compensation, what carried out the laminating of the uniaxial stretched film was known. However, since there was the need of controlling the crossed axes angle of requiring a laminating process or an extension shaft to altitude, if it was deficient in manufacture effectiveness, and the uniaxial stretched film of two or more sheets was required and the phase contrast plate pulled by lamination, there was a trouble which a liquid crystal display forms into a thick mold.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to the phase contrast plate by this invention, by satisfying the above-mentioned conditions of Re and Rz, altitude can be compensated for change of the display property by the viewing angle based on the birefringence of a liquid crystal cell, and the liquid crystal display which is excellent in visibility, such as contrast and monochrome display, can be obtained.
[0007]
[Embodiment of the Invention] The phase contrast plate by this invention satisfies 20 nm<Re<500nm and Re<Rz, when the principal indices of refraction of nx, ny, and the thickness direction are set to nz for the principal indices of refraction within a field and thickness is made into d, d=Re (nx-ny), and d=Rz (nz-nx) by nx>ny.
[0008] The phase contrast plate in which the aforementioned property is shown can paste up a heat shrink nature film on one side or both sides of for example, a polymer film, and can obtain it with the method used as the form birefringence film with which the polymer film was processed and thickness increased under grant of the shrinkage force by heating.
[0009] In the above, from points, such as the efficient achievement nature of the above-mentioned property, as a heat shrink nature film, contraction in one directions, such as the cross direction (MD), is 5% or more, and contraction of the direction which intersects perpendicularly with the above of the die-length direction (TD) etc. is 8% or more, and 30% or less of thing can use [the differential shrinkage of these rectangular cross direction] preferably.
[0010] On the other hand, although the proper method by for example, the roll drawing machine, a biaxial-stretching machine, etc. can be taken for the aforementioned processing, as for processing temperature, it is more desirable than points, such as the efficient achievement nature of the above-mentioned property, to carry out to more than the glass transition point near the glass transition point of a polymer film. Properties, such as the refractive index concerned in the form birefringence film obtained, are controllable by thickness change of the class of polymer film, thickness and contraction, processing temperature, and a polymer film etc.
[0011] The proper thing which can form a bright film can be used as a polymer which forms the film of said processing object, and there is especially no limitation. The polymer which is excellent in transparency and in which light transmittance can form 80% or more of film above all is desirable. Moreover, from points, such as the efficient achievement nature of the conditions about above-mentioned Re and above-mentioned Rz, the ingredient below 5/1012cm2/dyn can use [a photoelastic coefficient] preferably.
[0012] Moreover, although a polymer film can be classified according to the relation between the extension direction and a refractive index as what shows a forward or negative birefringence property and the all can be used in this invention as aforementioned, the film which consists of a polymer which shows the forward birefringence property that the refractive index of the extension direction becomes high is more desirable than the point of obtaining what attains the property concerned efficiently with the above-mentioned mode of processing, and is excellent in thermal resistance etc.

[0013] As a polymer which can form the form birefringence film in which a forward birefringence property is incidentally shown, a polycarbonate, polyvinyl alcohol, a cellulose system polymer, the polyester like polyethylene terephthalate or polyethylenenaphthalate, polyarylate, polyimide, a norbornene system polymer, polysulfone, PONOETERUSURUHON, the polyolefine like polypropylene, etc. are raised, for example. Above all, it is amorphous and the polymer which is excellent in thermal resistance can use preferably.

[0014] A polymer film may be formed by the casting methods, such as for example, the casting method, and proper methods, such as an extrusion method. The solution producing-film methods, such as the casting method, are more desirable than the point of obtaining a polymer film with little thickness nonuniformity, orientation distorted nonuniformity, etc. Although the target phase contrast etc. can determine the thickness of a polymer film suitably, generally it is set to 20-300 micrometers above all 10-500 micrometers.

[0015] Although it is more desirable than points, such as thin-shape-izing, to be formed as a single layer material of a form birefringence film as for the phase contrast plate by this invention, it may be formed as a layered product of congener or a form birefringence film of a different kind, and may be protected thru/or reinforced with an isotropic transparent polymer layer, an isotropic glass layer, etc.

[0016] The phase contrast plate by this invention can be preferably used for compensation of the viewing-angle property by the birefringence in various kinds of liquid crystal cells, such as TN molds and the STN molds which prevented the fall of the contrast for example, in the direction of a transverse plane, such as denial compensation of the direction phase contrast of strabism, and denial compensation of the phase contrast of the direction of a transverse plane, and the direction of strabism, and pi mold, etc.

[0017] Although it can use for optical compensation of a liquid crystal cell etc. preferably like the above, the phase contrast plate by this invention can also be used as a layered product with a polarizing plate, when the display which consists of the liquid crystal cell is accompanied by the polarizing plate. The laminating polarizing plate was illustrated to drawing 1 R> 1. For 1, a polarizing plate and 2 are [a glue line and 3] phase contrast plates. In the example of drawing, in order to paste a liquid crystal cell etc., the glue line 2 which consists of a binder is attached to the outside of the phase contrast plate 3.

[0018] A proper thing can be used for the aforementioned polarizing plate, and there is especially no limitation. The polarization film which consists of a polyene oriented film like the thing and the dehydration processing object of polyvinyl alcohol which iodine and/or dichromatic dye were made to stick to the hydrophilic high polymer film like a polyvinyl alcohol system film, a partial formal-ized polyvinyl alcohol system film, and an ethylene-vinylacetate copolymer system partial saponification film, and were generally extended, or the demineralization acid-treatment object of a polyvinyl chloride etc. thru/or the thing which prepared the protective layer in it are used.

[0019] Transparent adhesives, such as acrylic, thru/or a binder, etc. can be used for the laminating of a phase contrast plate and a polarizing plate. There is especially no limitation about the class of the adhesives etc. What does not require a process hot by hardening, desiccation, etc. in the case of a laminating is desirable, and what does not require hardening processing or the drying time of long duration is more desirable than the point of preventing change of optical properties, such as a phase contrast plate. In addition, when carrying out the laminating of that from which a refractive index differs, the adhesives which have a middle refractive index from points, such as control of reflection loss, are used preferably.

[0020] Formation of the liquid crystal display using the phase contrast plate by this invention can be performed according to the former. That is, an according [on this invention and] to this invention like the above although formed by assembling suitably component parts, such as phase contrast plate [for liquid crystal cell and optical compensation] and as occasion demands polarizing plate [liquid crystal display]-generally and lighting system, and incorporating drive circuit etc. phase contrast plate is used for the thing for optical compensation, there is especially no limitation except for the point of a liquid crystal cell prepared in one side at least about it, and it may apply to the former correspondingly.

[0021] Therefore, proper liquid crystal displays, such as a liquid crystal display which has arranged the polarizing plate on one side or the both sides of a liquid crystal cell, and a thing which used the back light or the reflecting plate for the lighting system, can be formed. As for the phase contrast plate for optical compensation, in the case of the liquid crystal display using a polarizing plate, it is more desirable than the point of a compensation effect etc. to arrange between a liquid crystal cell, a polarizing plate, especially the polarizing plate by the side of a check by looking. On the occasion of the arrangement, what was used as the above-mentioned laminating polarizing plate can also be used.
[0022] The example of a configuration of the liquid crystal display which used the polarizing plate for drawing 2 and drawing 3 was shown. For 4, a liquid crystal cell and 5 are [a back light system and 6] reflecting layers. In addition, 7 is an optical diffusion plate. The lighting system which the lighting system which arranges the phase contrast plate for [in the thing of drawing 4] optical compensation to both sides is the thing of a back light mold, and, as for the thing of drawing 5, arranges the phase contrast plate for optical compensation only at one side is the thing of a reflective mold.
[0023] In the above, laminating unification may be carried out and the formation components of a liquid crystal display may be in a separation condition. Moreover, on the occasion of formation of a liquid crystal display, proper optical elements, such as a diffusion plate, an anti glare layer and an antireflection film, a protective layer, and a guard plate, can be arranged suitably, for example.
[0024] What compensates the phase contrast by the birefringence of a liquid crystal cell over the large viewing-angle range as a phase contrast plate for optical compensation is used preferably. Thereby, coloring prevention etc. is attained over the large viewing-angle range. Although the liquid crystal cell to apply is arbitrary, it is preferably applicable to liquid crystal cells, such as TN mold for forming a TFT mold liquid crystal display etc., and pi mold.

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TECHNICAL PROBLEM

[The technical technical problem of invention] This invention makes it a technical problem to obtain the thin phase contrast plate with which altitude can be compensated for the birefringence by the liquid crystal cell, and to obtain the liquid crystal display which is excellent in visibility, such as contrast and monochrome display, in the large viewing-angle range.

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MEANS

[Means for Solving the Problem] When this invention sets the principal indices of refraction of nx, ny, and the thickness direction to nz for the principal indices of refraction within a field and thickness is made into d, d=Re (nx-ny), and d=Rz (nz-nx) by nx>ny, The phase contrast plate characterized by satisfying 20 nm<Re<500nm and Re<Rz, And the laminating polarizing plate characterized by consisting of a layered product of it and a polarizing plate and the liquid crystal display characterized by the thing of a liquid crystal cell for which it has said phase contrast plate, or it and a polarizing plate in one side at least at a list are offered.

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EXAMPLE

[Example] Cast continuously the 20-% of the weight solution by the methylene dichloride of the molecular-weight about 80,000 polycarbonate which consists of example 1 phosgene and a polycondensation object of bisphenol A on the steel drum, and strip it off one by one, it was made to dry, and phase contrast obtained the polycarbonate film (photoelastic coefficient of 7.4/1012cm 2/dyn) of about 0 by 60 micrometers in thickness.
[0026] Next, it exfoliated, after TD contraction pasted up the polypropylene film which is 20% through the acrylic adhesive layer at 35% on both sides of said film and MD contraction performed 8% of contraction to the polypropylene film at 162 degrees C by the roll drawing machine, and the form birefringence film (phase contrast plate) with a thickness of 76 micrometers was obtained.
[0027] TD contraction exfoliated, after performing 4% of contraction to one side of a polycarbonate film with a same thickness [as example 2 example 1] of 60 micrometers at 150 degrees C by the roll drawing machine at the polypropylene film by MD contraction pasting up the polypropylene film which is 40% through an acrylic adhesive layer at 20%, and it obtained the form birefringence film (phase contrast plate) with a thickness of 72 micrometers.
[0028] After phase contrast obtained the polycarbonate film of about 0 by 100 micrometers in thickness according to example 3 example 1, it exfoliated, after TD contraction pasted up the polypropylene film which is 35% on the both sides through the acrylic adhesive layer at 25% and MD contraction performed 5% of contraction to the polypropylene film at 158 degrees C by the roll drawing machine, and the form birefringence film (phase contrast plate) with a thickness of 127 micrometers was obtained.
[0029] 5% of contraction was performed to the polypropylene film at 158 degrees C by the roll drawing machine, and also MD contraction pasted up the polypropylene film whose TD contraction is 50% at 10% on example both sides of a comparison, and the form birefringence film (phase contrast plate) with a thickness of 77 micrometers was obtained according to the example 1. It was what a wrinkle cannot generate and use for this film in the direction of TD concerned.
[0030] About the form birefringence film obtained in the evaluation trial 1 optical-property example and the example of a comparison, the principal indices of refraction nx, ny, and nz of the thickness direction were investigated in the film plane (the product made from the Oji measuring machine machine, KOBRA-21ADH; parallel-nicol rotation method principle), and Re and Rz were computed from the value.
[0031] The aforementioned result was shown in degree table.

	n_x	n_y	n_z	d(μm)	Re(nm)	Rz(nm)
実施例1	1.5847	1.5836	1.5867	76	78	152
実施例2	1.5846	1.5841	1.5863	72	37	120
実施例3	1.5847	1.5817	1.5886	127	375	506
比較例	1.5856	1.5818	1.5876	77	295	156

[0032] When the polarizing plate is arranged through the phase contrast plate obtained in the examples 1-3 on both sides of an evaluation trial 2 TN-liquid-crystal cel and the display property by the contrast of the direction of a transverse plane and viewing-angle change was investigated, it was the liquid crystal display of the high display grace which is excellent in contrast, is changeless in a display property in the large viewing-angle range, and is excellent in visibility.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The sectional view which illustrated the laminating polarizing plate
[Drawing 2] The sectional view which illustrated the liquid crystal display
[Drawing 3] The sectional view which illustrated other liquid crystal displays
[Description of Notations]
1: Polarizing plate 2: Glue line 3: Phase contrast plate 4: Liquid crystal cell

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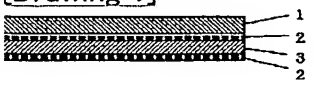
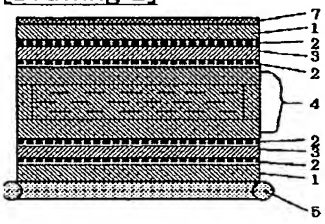
DRAWINGS

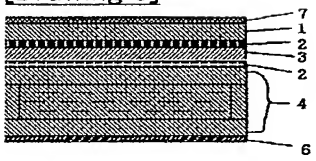
[Drawing 1]



[Drawing 2]



[Drawing 3]



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CLAIMS

[Claim(s)]
[Claim 1] The phase contrast plate characterized by satisfying 20 nm<Re<500nm and Re<Rz when the principal indices of refraction of nx, ny, and the thickness direction are set to nz for the principal indices of refraction within a field and thickness is made into d, d=Re (nx-ny), and d=Rz (nz-nx) by nx>ny.
[Claim 2] The phase contrast plate which consists of a polymer which shows a forward birefringence property in claim 1.
[Claim 3] The phase contrast plate with which a photoelastic coefficient consists of an ingredient below 5/1012cm2/dyn in claim 1 or 2.
[Claim 4] The laminating polarizing plate characterized by consisting of a layered product of a phase contrast plate and a polarizing plate according to claim 1 to 3.
[Claim 5] The liquid crystal display characterized by the thing of a liquid crystal cell for which it has a phase contrast plate according to claim 1 to 3, or it and a polarizing plate in one side at least.

[Translation done.]

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(54)【発明の名称】　位相差板、積層偏光板及び液晶表示装置

(57)【要約】
【課題】　液晶セルによる複屈折を高度に補償できる薄型の位相差板を得て、広い視角範囲でコントラストや白黒表示等の視認性に優れる液晶表示装置を得ること。
【解決手段】　面内の主屈折率をｎ，、ｎ，、厚さ方向の主屈折率をｎ，とし、かつｎ，＞ｎ，で厚さをｄ、（ｎ，－ｎ，）ｄ＝Ｒｅ、（ｎ，－ｎ，）ｄ＝Ｒｚとしたとき、２０ｎｍ＜Ｒｅ＜５００ｎｍ及びＲｅ＜Ｒｚを満足する位相差板、及びそれと偏光板との積層体からなる積層偏光板、並びに液晶セルの少なくとも片側に前記位相差板、又はそれと偏光板を有する液晶表示装置。

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【特許請求の範囲】

【請求項１】　面内の主屈折率をn$_x$、n$_y$、厚さ方向の主屈折率をn$_z$とし、かつn$_x$＞n$_y$で厚さをｄ、（n$_x$－n$_y$）ｄ＝Ｒｅ、（n$_x$－n$_z$）ｄ＝Ｒｚとしたとき、２０nm＜Ｒｅ＜５００nm及びＲｅ＜Ｒｚを満足することを特徴とする位相差板。

【請求項２】　請求項１において、正の複屈折特性を示すポリマーからなる位相差板。

【請求項３】　請求項１又は２において、光弾性係数が５／１０^{12} cm^2／dyn以下の材料からなる位相差板。

【請求項４】　請求項１～３に記載の位相差板と偏光板との積層体からなることを特徴とする積層偏光板。

【請求項５】　液晶セルの少なくとも片側に、請求項１～３に記載の位相差板、又はそれと偏光板を有することを特徴とする液晶表示装置。

【発明の詳細な説明】

【０００１】

【発明の技術分野】本発明は、液晶セルの光学補償による視角特性の改善に好適な位相差板、並びにそれを用いた積層偏光板及び液晶表示装置に関する。

【０００２】

【従来の技術】液晶による複屈折で表示装置を見る視角により表示色やコントラスト等が変化することの防止を目的に、液晶セルに対し位相差板を配置して複屈折に基づく光学特性を補償して視角特性を改善する技術が提案されている。

【０００３】従来、かかる補償用の位相差板としては、一軸延伸フィルムを積層したものが知られていた。しかしながら、積層工程を要することや延伸軸の交差角を高度に制御する必要のあることなどから製造効率に乏しく、かつ２枚以上の一軸延伸フィルムを要して積層化により位相差板が、ひいては液晶表示装置が厚型化する問題点などがあった。

【０００４】

【発明の技術的課題】本発明は、液晶セルによる複屈折を高度に補償できる薄型の位相差板を得て、広い視角範囲でコントラストや白黒表示等の視認性に優れる液晶表示装置を得ることを課題とする。

【０００５】

【課題の解決手段】本発明は、面内の主屈折率をn$_x$、n$_y$、厚さ方向の主屈折率をn$_z$とし、かつn$_x$＞n$_y$で厚さをｄ、（n$_x$－n$_y$）ｄ＝Ｒｅ、（n$_x$－n$_z$）ｄ＝Ｒｚとしたとき、２０nm＜Ｒｅ＜５００nm及びＲｅ＜Ｒｚを満足することを特徴とする位相差板、及びそれと偏光板との積層体からなることを特徴とする積層偏光板、並びに液晶セルの少なくとも片側に前記位相差板、又はそれと偏光板を有することを特徴とする液晶表示装置を提供するものである。

【０００６】

【発明の効果】本発明による位相差板によれば、上記したＲｅとＲｚの条件を満足することにより、液晶セルの複屈折に基づく視角による表示特性の変化を高度に補償でき、コントラストや白黒表示等の視認性に優れる液晶表示装置を得ることができる。

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【０００７】

【発明の実施形態】本発明による位相差板は、面内の主屈折率をn$_x$、n$_y$、厚さ方向の主屈折率をn$_z$とし、かつn$_x$＞n$_y$で厚さをｄ、（n$_x$－n$_y$）ｄ＝Ｒｅ、（n$_x$－n$_z$）ｄ＝Ｒｚとしたとき、２０nm＜Ｒｅ＜５００nm及びＲｅ＜Ｒｚを満足するものからなる。

【０００８】前記の特性を示す位相差板は、例えばポリマーフィルムの片面又は両面に熱収縮性フィルムを接着し、加熱による収縮力の付与下にポリマーフィルムを処理して厚さが増大した複屈折性フィルムとする方式などにより得ることができる。

【０００９】前記において上記特性の効率的達成性などの点より熱収縮性フィルムとしては、幅方向（ＭＤ）等の一方向における収縮率が５％以上で、長さ方向（ＴＤ）等の前記に直交する方向の収縮率が８％以上であり、かつそれら直交方向の収縮差が３０％以下のものが好ましく用いうる。

【００１０】一方、前記の処理には例えばロール延伸機や二軸延伸機などによる適宜な方式を採りうるが、処理温度はポリマーフィルムのガラス転移点の近傍ないしガラス転移点以上とすることが上記特性の効率的達成性などの点より好ましい。得られる複屈折性フィルムにおける当該屈折率等の特性は、ポリマーフィルムの種類や厚さ、収縮率や処理温度、ポリマーフィルムの厚さ変化等にて制御することができる。

【００１１】前記処理対象のフィルムを形成するポリマーとしては、透明フィルムを形成しうる適宜なものを用いることができ、特に限定はない。透明性に優れる、就中、光透過率が８０％以上のフィルムを形成しうるポリマーが好ましい。また上記したＲｅとＲｚに関する条件の効率的達成性などの点より、光弾性係数が５／１０^{12} cm^2／dyn以下の材料が好ましく用いうる。

【００１２】またポリマーフィルムは、延伸方向と屈折率の関係で正又は負の複屈折特性を示すものとして分類でき、本発明にては前記のとおりそのいずれも用いうるが、上記の処理方式にて当該特性を効率よく達成し、かつ耐熱性に優れるものを得る点などよりは、延伸方向の屈折率が高くなる正の複屈折特性を示すポリマーからなるフィルムが好ましい。

【００１３】ちなみに正の複屈折特性を示す複屈折性フィルムを形成しうるポリマーとしては、例えばポリカーボネート、ポリビニルアルコール、セルロース系ポリマー、ポリエチレンテレフタレートやポリエチレンナフタレートの如きポリエステル、ポリアリレート、ポリイミド、ノルボルネン系ポリマー、ポリスルホン、ポノエーテルスルホン、ポリプロピレンの如きポリオレフィンな

どがあげられる。就中、非晶質で耐熱性に優れるポリマーが好ましく用いうる。

【００１４】ポリマーフィルムは、例えば流延法等のキャスティング法や、押出法などの適宜な方式で形成したものであってよい。キャスティング法等の溶液製膜法が厚さムラや配向歪ムラ等の少ないポリマーフィルムを得る点などより好ましい。ポリマーフィルムの厚さは、目的とする位相差などにより適宜に決定しうるが、一般には１０～５００μm、就中２０～３００μmとされる。

【００１５】本発明による位相差板は、薄型化等の点より複屈折性フィルムの単層物として形成されていることが好ましいが、同種又は異種の複屈折性フィルムの積層体として形成されていてもよいし、等方性の透明なポリマー層やガラス層等で保護ないし補強されたものであってもよい。

【００１６】本発明による位相差板は、例えば正面方向でのコントラストの低下を防止した斜視方向位相差の打消し補償や、正面方向と斜視方向の位相差の打消し補償等の、ＴＮ型やＳＴＮ型やπ型等の各種の液晶セルにおける複屈折による視角特性の補償などに好ましく用いうる。

【００１７】本発明による位相差板は、前記の如く液晶セルの光学補償等に好ましく用いうるが、その液晶セルからなる表示装置が偏光板を伴う場合には、偏光板との積層体として用いることもできる。その積層偏光板を図１に例示した。１が偏光板、２が接着層、３が位相差板である。図例では、液晶セル等に接着するために粘着剤からなる接着層２が位相差板３の外側に付設してある。

【００１８】前記の偏光板には適宜なものを用いることができ、特に限定はない。一般には、例えばポリビニルアルコール系フィルムや部分ホルマール化ポリビニルアルコール系フィルム、エチレン・酢酸ビニル共重合体系部分ケン化フィルムの如き親水性高分子フィルムにヨウ素及び／又は二色性染料を吸着させて延伸したもの、ポリビニルアルコールの脱水処理物やポリ塩化ビニルの脱塩酸処理物の如きポリエン配向フィルムなどからなる偏光フィルム、ないしそれに保護層を設けたものなどが用いられる。

【００１９】位相差板と偏光板との積層等には、例えばアクリル系等の透明な接着剤、ないし粘着剤などを用いることができる。その接着剤等の種類については特に限定はない。位相差板等の光学特性の変化を防止する点より、積層の際に硬化や乾燥等で高温のプロセスを要しないものが好ましく、長時間の硬化処理や乾燥時間を要しないものが望ましい。なお屈折率が異なるものを積層する場合には、反射損の抑制などの点より中間の屈折率を有する接着剤等が好ましく用いられる。

【００２０】本発明による位相差板を用いての液晶表示装置の形成は、従来に準じて行いうる。すなわち液晶表示装置は一般に、液晶セルと光学補償用の位相差板、及び必要に応じての偏光板や照明システム等の構成部品を適宜に組立てて駆動回路を組込むことなどにより形成されるが、本発明においては上記の如く、本発明による位相差板を光学補償用のものに用いて、それを液晶セルの少なくとも片側に設ける点を除いて特に限定はなく、従来に準じうる。

【００２１】従って、液晶セルの片側又は両側に偏光板を配置した液晶表示装置や、照明システムにバックライトあるいは反射板を用いたものなどの適宜な液晶表示装置を形成することができる。偏光板を用いた液晶表示装置の場合、光学補償用の位相差板は液晶セルと偏光板、特に視認側の偏光板との間に配置することが補償効果の点などより好ましい。その配置に際しては、上記の積層偏光板としたものを用いることもできる。

【００２２】図２、図３に偏光板を用いた液晶表示装置の構成例を示した。４が液晶セル、５がバックライトシステム、６が反射層である。なお７は光拡散板である。図４のものは両側に光学補償用の位相差板が配置してある照明システムがバックライト型のものであり、図５のものは片側にのみ光学補償用の位相差板が配置してある照明システムが反射型のものである。

【００２３】前記において液晶表示装置の形成部品は、積層一体化されていてもよいし、分離状態にあってもよい。また液晶表示装置の形成に際しては、例えば拡散板やアンチグレア層、反射防止膜、保護層や保護板などの適宜な光学素子を適宜に配置することができる。

【００２４】光学補償用の位相差板としては、液晶セルの複屈折による位相差を広い視角範囲にわたり補償するものが好ましく用いられる。これにより、広い視角範囲にわたり着色防止等が達成される。適用する液晶セルは任意であるが、ＴＦＴ型液晶表示装置等を形成するためのＴＮ型やπ型などの液晶セルに好ましく適用することができる。

【００２５】

【実施例】実施例１

ホスゲンとビスフェノールＡの重縮合物からなる分子量約８万のポリカーボネートの二塩化メチレンによる２０重量％溶液を、スチールドラム上に連続的に流延し、それを順次剥取って乾燥させ、厚さ６０μmで位相差がほぼ０のポリカーボネートフィルム（光弾性係数７．４／10^{12} cm^2／dyn）を得た。

【００２６】次に、前記フィルムの両面にMD収縮率が３５％でＴＤ収縮率が２０％のポリプロピレンフィルムをアクリル系粘着層を介し接着し、ロール延伸機にて１６２℃でそのポリプロピレンフィルムに８％の収縮を施したのち剥離して、厚さ７６μmの複屈折性フィルム（位相差板）を得た。

【００２７】実施例２

実施例１と同じ厚さ６０μmのポリカーボネートフィルムの片面にMD収縮率が２０％でＴＤ収縮率が４０％の

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ポリプロピレンフィルムをアクリル系粘着層を介し接着し、ロール延伸機にて１５０℃でそのポリプロピレンフィルムに４％の収縮を施したのち剥離して、厚さ７２μmの複屈折性フィルム（位相差板）を得た。

【００２８】実施例３

実施例１に準じ厚さ１００μmで位相差がほぼ０のポリカーボネートフィルムを得た後、その両面にMD収縮率が２５％でTD収縮率が３５％のポリプロピレンフィルムをアクリル系粘着層を介し接着し、ロール延伸機にて１５８℃でそのポリプロピレンフィルムに５％の収縮を施したのち剥離して、厚さ１２７μmの複屈折性フィルム（位相差板）を得た。

【００２９】比較例

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＊両面にMD収縮率が１０％でTD収縮率が５０％のポリプロピレンフィルムを接着し、ロール延伸機にて１５８℃でそのポリプロピレンフィルムに５％の収縮を施したほかは実施例１に準じて厚さ７７μmの複屈折性フィルム（位相差板）を得た。このフィルムには、当該TD方向に皺が発生し、実用できないものであった。

【００３０】評価試験１

光学特性

実施例、比較例で得た複屈折性フィルムについて、フィルム面内と厚さ方向の主屈折率n_x、n_y、n_zを調べ（王子計測機器製、KOBRA－２１ADH；平行ニコル回転法原理）、その値よりRe，Rzを算出した。

【００３１】前記の結果を次表に示した。

	n_x	n_y	n_z	d(μm)	Re(nm)	Rz(nm)
実施例１	1.5847	1.5836	1.5867	７６	７８	１５２
実施例２	1.5846	1.5841	1.5863	７２	３７	１２０
実施例３	1.5847	1.5817	1.5886	１２７	３７５	５０６
比較例	1.5856	1.5818	1.5876	７７	２９５	１５６

【００３２】評価試験２

TN型液晶セルの両側に、実施例１～３で得た位相差板を介して偏光板を配置し、正面方向のコントラストと視角変化による表示特性を調べたところ、コントラストに優れて広い視角範囲で表示特性に変化はなく、視認性に優れる高表示品位の液晶表示装置であった。

【図面の簡単な説明】

※【図１】積層偏光板を例示した断面図

【図２】液晶表示装置を例示した断面図

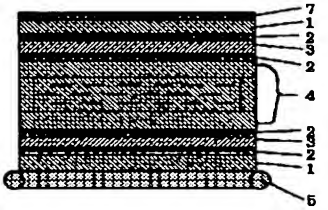
【図３】他の液晶表示装置を例示した断面図

【符号の説明】

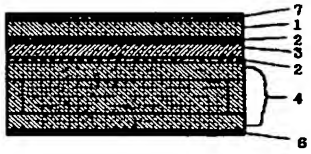
１：偏光板　２：接着層　３：位相差板　４：液晶セル

【図１】

【図２】



【図３】



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